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# Surface-Enhanced Raman Scattering to Evaluate Nanomaterial Cytotoxicity on Living Cells

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## Abstract

© 2016 American Chemical Society.The increasing number of reports about false positive or negative results from conventional cytotoxicity assays of nanomaterials (NMs) suggests that more reliable NM toxicity assessment methods should be developed. Here, we report a novel approach for nanotoxicity evaluation based on surface-enhanced Raman spectroscopy (SERS). Three model NMs were tested on two model cell lines and the results were validated by WST-1 cytotoxicity assay and annexin V-FITC/propidium iodide (PI) staining as apoptosis-necrosis assay. The localization of nanoparticles (NPs) in the cells and the cellular conditions upon NP incubation were visualized by transmission electron microscopy (TEM) and enhanced dark-field (EDF) microscopy. SERS revealed a broader view on the consequences of cell-NM interactions compared to the conventional cytotoxicity assays where only one aspect of toxicity can be measured by one assay type. The results suggest that SERS can significantly contribute to the cytotoxicity evaluation bypassing NM or assay component-related complications with less effort.

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